Notes on Elasmobranch Eggs

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(with three text figures)

I. *Unidentified material*

Work on the spirit collections in the Raffles Museum has brought to light material collected by Capt. A. N. Fraser in July, 1913, from a telegraph cable lying at a depth of 300 fathoms, lat. 10° 27′ 46″ S. and long. 126° 4′ 30″ E. in the Timor Sea, N. W. of Australia.

It makes an interesting addition to the series of egg-cases examined by me in 1926—7 (Journ. Malayan Br. R. A. S. IV, 1926, pp. 164—166, and V, 1927, pp. 355—359).

In the present instance it is unfortunately impossible to determine even the genus, but if the form of the case (Fig. 1) is any

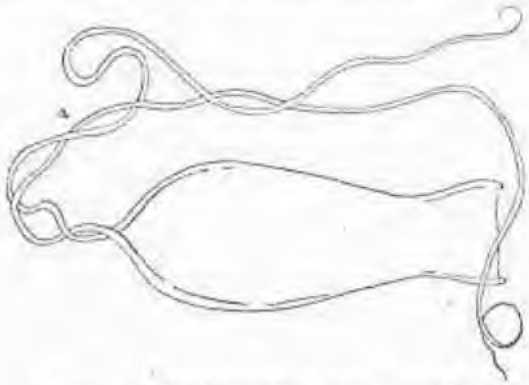

Fig. 1. Unidentified egg-capsule.

indication of its affinities, it may be placed between the genera *Scyllium*, with four tendrils, and *Chiloscyllium*, where tendrils are completely absent and anchorage is effected by means of a band of threads.

The egg-cases, of which six were taken attached to a hydroid which was presumably growing on the cable, are about 2 inches in length by a little over ¾ inch in greatest depth. In form they resemble a small *Scyllium* case, but the tendrils, about 5 inches in length, occur only at the posterior end of the case which, as in *Scyllium*, is contracted so that the corners approach one another giving a pointed appearance. The anterior end is truncate, with corners widely separated, and has no trace of tendrils in any of the cases examined.

The embryo, in the only specimen bearing one, is about 1¼ inches in length, in an early stage of development, and in very poor condition. It had been squeezed out of the anterior end of the case, but was connected by a duct to a yolk-sac, ¾ inch in diameter, within the case. The specimen had unfortunately been preserved in strong spirit, and I could therefore make no identification.

II. *Orientation and Rotation of the Embryo in Scyliidae.*

In writing my previous notes on the egg-cases of *Scyliidae* I made certain observations on the position of the embryo in relation to the capsule. I have recently had an opportunity of seeing R. S. Clark's comprehensive papers on Rays and Skates[1] which were not previously available to me. His observations were carried out on living specimens in an aquarium; owing to the lack of facilities such methods cannot be employed locally, nor is material so readily accessible.

The embryos examined by Clark were "observed to undergo complete turning movements on the horizontal plane". Re-examination of the series of embryos of *Chiloscyllium indicum* points to the occurrence of a similar phenomenon in this species.

The material dealt with consisted of a series of five separate egg-cases which I numbered 1—5 in order of development, and a second series of three cases attached to one another by the filamentous band which is a striking feature of the egg-cases of the species.

Of this latter group one case was empty, the embryo having apparently hatched out, as the anterior end of the case was open; the other two contained embryos.

Incorporating this group with the other five, and reading the whole as a single series, but retaining the original numbering for the sake of comparison these three cases now become Nos. 4*a*, 6 and 7.

The full list now reads:—[2]

1. Embryo minute, adhering to wall of case.

2. Embryo, 50 mm. in length, lying along upper margin of case; head pointing to *anterior* end.

[1] Journ. Marine Biol. Assoc. XII, 1922, pp. 577—643 and XIV, 1927, pp. 661—683.

[2] As before I have used the term *anterior* to apply to the wider end of the case, through which the embryo escapes; the pointed end is the *posterior*. The upper margin is that from which the band of threads arises. The very young embryo is therefore in the *normal* position, head pointing anteriorly, dorsal surface uppermost. In the later stages the embryo turns, apparently always on to the same side.

3 and 4. Embryo, 90 mm. in length, with form and markings similar to adult, lying coiled in case; head pointing to *anterior* end of case. (Fig. 2).

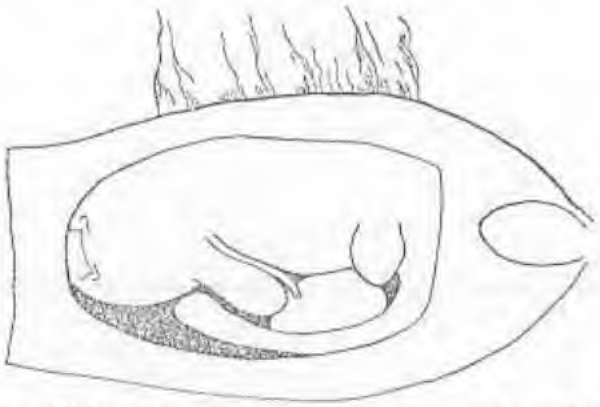

Fig. 2. *Chiloscyllium indicum*. Egg-case with wall cut away to show embryo. Stage 4.

(In these and subsequent stages the embryo has turned laterally through a right-angle, and is lying with its ventral surface apposed to the left wall of the egg-case).

4*a*. Young male at rather more advanced stage than the preceding, head pointing to *anterior* end.

5. Embryo of 95 mm. lying with head pointed towards *posterior* end of case. (Fig. 3).

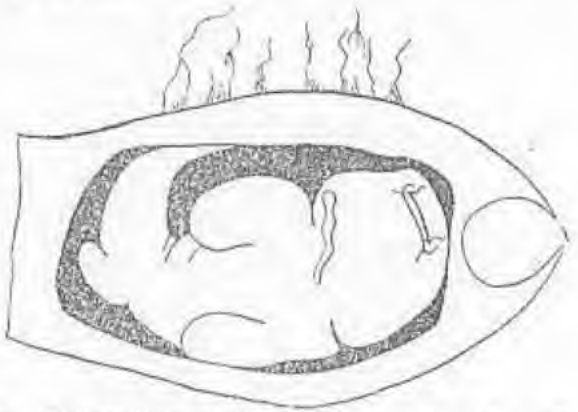

Fig. 3. *Chiloscillium indicum*. Egg-case with wall cut away to show embryo. Stage 5.

6. Female almost ready for hatching; head anterior.

The embryo therefore appears to make a complete turn during the later stages of development before hatching.

The specimens of other species available were too few for a comparison with regard to rotation, but the following points emerge.

The newly-deposited capsule of the ray has no provision for anchorage by tendrils. After extrusion it must therefore rely on accidental entanglement of the fibrous attachment processes. It falls on to one side which then becomes the ventral surface and the embryo develops accordingly. In those cases where hooks are developed at the closed (posterior) end there is a tendency for the more convex wall to become the dorsal surface. The embryo begins life in the same plane in which it lies on escape, which is accomplished, as a rule, through the anterior end of the capsule. During that period of development which precedes curling, the embryo usually lies with the head pointing to the closed end of the capsule.

The species of *Scyliidae* examined were *Chiloscyllium indicum*, *Scyllium marmoratum*, *Stegostoma tigrinum* and an unidentified species. The typical Scyliid possesses tendrils which become attached to some fixed object before extrusion of the capsule, and will therefore not tend to fall on one side. *Chiloscyllium* has retained the typical mode of development, but here the attachment band, though less efficient than the tendrils of *Scyllium*, is a much more specialized anchor than the shorter felt-like mass seen in the Rays. The walls of the Scyliid capsule are equally convex. The embryo begins life in what may be termed the normal plane of the capsule. As it increases in length beyond the limits of the capsule it turns on its side for convenience in curling. It is then in the same plane as the Ray and rotates as curling takes place.

Stegostoma, although without anchorage, has not forsaken the typical Scyliid method of development, at least in the early stages. It is not yet known whether it changes position before hatching, but it is quite possible that it does not, as development appears to take place very rapidly, the external adult features being present whilst the embryo is still lying along the upper margin of the capsule, and food-yolk still lying loose in the case.